

1 THE EMBODIMENTS OF THE INVENTION IN WHICH AN
2 EXCLUSIVE PROPERTY OR PRIVILEGE IS BEING CLAIMED ARE DETAILED
3 AS FOLLOWS:
4

5 1. A tool for removal of a broken threaded fastener in a stud bore
6 of a cylinder head, and rehabilitation thereof, the tool comprising:

7 an alignment block adapted for attachment at least two intact
8 stud bores of a cylinder head;

9 at least one pilot port located in the alignment block for
10 alignment over the broken stud;

11 a series of steady pilots for removing the broken stud and
12 rehabilitating the stud bore, the pilots removably secured to the pilot port; and

13 a series of rotary tools corresponding to the steady pilots
14 forming tool pairs, the rotary tools adapted for removal of the broken threaded
15 fastener from the stud bore, and rehabilitation thereof, the series of pilot and rotary
16 tool pairs comprising:

17 an end mill and cooperating milling pilot for flat or concave
18 milling of the end of the broken threaded fastener;

19 a drill bit and cooperating drilling pilot for drilling the end of the
20 broken threaded fastener; and

21 a tap and cooperating threaded tapping pilot to form new
22 threads in the cylinder head.

23
24 2. The tool of claim 1 wherein:

1 the drill forms and oversize stud bore; and
2 the tap forms oversized threads for installation of a coiled insert into
3 the oversize stud bore.

4
5 3. The tool of claim 1 wherein the alignment block is an elongate
6 member extending at least a portion of a length of the cylinder head.

7
8 4. The tool of claim 3 wherein the alignment block comprises:
9 a short elongate member having at least three holes along its length,
10 two holes being adapted for securing to two intact studs or stud bores, and one hole
11 acting as a pilot port for aligning over the broken threaded fastener.

12
13 5. The tool of claim 3 wherein the alignment block comprises:
14 a full length elongate member having holes spaced along its length
15 and corresponding to all stud bores along the cylinder head wherein at least two
16 holes being adapted for securing to two intact studs or stud bores, and one hole
17 acting as a pilot port for aligning over the broken threaded fastener.

18
19 6. The alignment block of claims 4 and 5 wherein the holes and
20 pilot ports along its length are of a pattern that matches a stud pattern of a Chevrolet
21 350 cylinder head.

1 7. A process for removal of a broken threaded fastener in a stud
2 bore of a cylinder head, and rehabilitation thereof, the process comprising the steps
3 of:

4 removing an exhaust manifold to reveal the broken threaded fastener
5 and the intact studs or stud bores;

6 fitting an alignment block over at least two intact studs or stud bores,
7 and securing the alignment block over at least two studs or stud bores in the cylinder
8 head for aligning a pilot port over the broken threaded fastener;

9 installing a milling pilot to the pilot port and milling using a cooperating
10 end mill for flat or concave milling of the end of the broken threaded fastener;

11 installing a drilling pilot to the pilot port and drilling using a cooperating
12 drill bit to remove the stud and threads for drilling the end of the broken threaded
13 fastener;

14 installing a tapping pilot to the pilot port and tapping the stud bore
15 using a cooperating tap to form new threads in the stud bore; and

16 fitting a replacement stud into the rehabilitated stud bore.

17

18 8. The process of claim 7 wherein after tapping the stud bore
19 further comprising inserting a coiled insert into the stud bore, the coiled insert having
20 outer threads matching the new threads and having inner threads matching a
21 replacement stud.

22